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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/594,718	07/20/2007	Yoshiki Nishibayashi	050212-0730	9399

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EXAMINER	
MILLER, DANIEL H	
ART UNIT	PAPER NUMBER
1783	

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08/04/2010	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/594,718	NISHIBAYASHI ET AL.	
	Examiner	Art Unit	
	DANIEL MILLER	1783	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *5/17/2010*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *9-18* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *9-18* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *2/1/2010*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

2. Claims 14-18 are rejected under 35 U.S.C. 102(b) as being anticipated by JP 2001015012 (translation).

3. JP '012 teaches an emitter formed from pyramid shaped diamond protrusions having a height of 1 micrometer and a density of 25 projections per micrometer [0014-16].

4. Therefore, given the density of the diamond tips and the height of the tips the emitter would inherently have an apex angle within applicant's claimed range.

5. Regarding the 102 rejection, and in response to applicant's argument that the JP reference does not teach a predetermined arrangement, this argument is found to be unconvincing. The masking and lithographic formations of the process of the JP 2001 reference and deposition of diamond particles (while the substrate is masked) inherently effects the arrangement of the needle like carbon projections. Therefore, to the extent to which the claim to a "predetermined arrangement" distinguished the final product the claim limitation is considered to be met. No patentable distinction is seen.

6. Regarding independent claim 14, applicant has added the claim language requiring that "the plurality of carbonaceous material projections being formed by etching using a mask."

7. Regarding independent claim 15, applicant has added the claim language requiring that the "conical shape being formed by etching a mask." The added limitations to the product claims 14 and 15 are considered product by process limitations that are not necessarily indicative of patentability of a claim to the product where in the structure is otherwise taught. In the instant case the structure is the same regardless of how it was formed. No patentable distinction is seen.

Claim Rejections - 35 USC § 103

8. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

9. Claims 9-18 are rejected under 35 U.S.C. 103(a) as being unpatentable over JP 2001015012 (translation) in view of Baik (Thin Solid Films 377-378 (2000) 29-302) further in view of Cathey (US 6,423,239) and Ageno (US 5,449,435) and ,Rogers, Using an Elastomeric phase mask for sub-100nm photolithography in optical near field; American Institute of Physics, March 1997.

10. JP '012 teaches an emitter formed from pyramid shaped diamond protrusions having a height of 1 micrometer and a density of 25 projections per micrometer [0014-16].

11. Baik teaches a method of producing a group of cone shaped diamond protrusion by using a patterned mask (wherein the method is concerned with uniformity). The silicon based mask is first applied as a uniform layer, then the mask is ion etched of into a pattern (removing portions of it and leaving holes), then the diamond layer is etched using an air plasma (laser) source. The mask dots have an edge that is considered to be inversely tapered from the aperture opening when formed by the etching process (see figures). Baik teaches that by varying the thickness and diameter of the patterned mask as well as processing time the sharpness of the tips (and therefore the diameter of tips, and aspect ratio, and apex angle) of the cone shaped diamond protrusions can be controlled.

12. Cathey (US 6,423,239) teaches a substantially similar method of producing a cone shaped protrusion with a two layered (30 and 32 from figures) masking and resist system.

13. Ageno (US 5,449,435) et al teaches a diamond protrusion produced using a multilayered masking and resist layer (see figures). The mask layer 202 (figures 5-11) is capable of being fabricated by several different methods, such as photolithography or a combination of deposition, photolithography, and etching processes to produce a hard mask such as a silicon-nitride mask. By selecting a preferred masking material, greater latitude of processing parameters is capable of being realized.

14. It would have been obvious to one of ordinary skill in the art at the time of the invention to provide the claimed process and product, given what is known by one of ordinary skill in the art, the substantial similarity of the above disclosed processes and the desired product of JP'012 and include a multilayered mask of Cathey to obtain sharper tips, and an optimal silicon nitride layer of stochiometrically stable proportions (obtaining applicant's claimed range) as a masking layer in order to achieve a greater latitude of processing parameters, wherein the greater latitude in processing parameters would allow for the processing time to be manipulated so that the size of the tips (and therefore the diameter of the tips, aspect ratio, and apex angle) of the cone shaped diamond protrusions can be controlled to form structures consistent within the parameters of Baik and applicant's claimed invention. No patentable distinction is seen.

15. Given the density of the diamond tips taught by JP '012 and the height of the tips the emitter (1 micron), one of ordinary skill would expect that the apex angle would inherently be within applicant's claimed range; or in the alternative it would have been obvious to provide the apex angle, as claimed, or to naturally arrive at an apex angle within the disclosed range through the use of the above described known techniques, given the similarities between the claimed methods and the combined taught method, in order to form the density of protrusions taught by JP '012. No patentable distinction is seen.

16. Regarding independent claim 9, applicant has added the claim language requiring "the mask having a shape of a circular cone and a circular truncated cone"

17. See In re Dailey, 357 F.2d 669, 149 USPQ 47 (CCPA 1966); where the court held that configuration (or shape) was a matter of choice which a person of ordinary skill in the art would have found obvious absent persuasive evidence that the particular configuration was significant. In the instant case, to the extent to which there is a difference in shape of the masking layer, which the examiner is not convinced exists given the shape of the final product, the shape of the mask is considered a choice which a person of ordinary skill in the art would have found obvious in order to form the circular cone shape of the cited arts final product. No patentable distinction is seen.

18. The examiner has (above) cited many complimentary methods of forming complex and patterned and shaped structure substantially identical to the claimed structure through known masking techniques. In particular Ageno teaches multilayer masking system not addressed in applicant's arguments and includes discussion of photolithographic techniques are considered appropriate for formation of such claimed structures (see above). Please see Rogers, Using an Elastomeric phase mask for sub-100nm photolithography in optical near field; American Institute of Physics, March 1997; wherein near field optical photolithography techniques are shown using first a resist layer and then a masking layer (see figures). The technique is taught to be especially easy for forming sub 100 nm features (including curves) and should provide for new optical features and allow for work with non-planar substrates (see abstract). Given the above teachings of Rogers and combined with other references one of ordinary skill would have used the claimed resist and Mask layers in order to form sub 100-nm features and/or curves that allow for new optical properties in the invention of JP 2001.

19. Regarding independent claim 14, applicant has added the claim language requiring that "the plurality of carbonaceous material projections being formed by etching using a mask." Regarding independent claim 15, applicant has added the claim language requiring that the "conical shape being formed by etching a mask." The newly added limitations are considered product by process limitations that are not necessarily indicative of patentability of a claim to the product where in the structure is otherwise taught. In the instant case the structure is the same regardless of how it was formed. No patentable distinction is seen.

Response to Arguments

20. Applicant's arguments filed 5/17/2010 have been fully considered but they are not persuasive.

21. Applicant's amendments to the independent claim 9 have overcome the 112 rejection previously asserted.

22. *Regarding the 102 rejection, the tips of the projections in JP '012 are considered to be smaller than the base of the projection as claimed (see figures) and the shape of the carbonaceous material is considered to be "approximately conical shape" as it is depicted as having a tapered projection consistent with the claimed shape (see figures of JP'012).*

23. Applicant's main argument is that the references do not fairly teach or suggest the feature of using a resist layer and then a mask layer in forming the features of the

invention. Further, because of this applicant has asserted that the angles claimed would not be formed inherently or through obvious modification. The examiner disagrees.

24. The examiner has (above) cited many complimentary methods of forming complex and patterned structure substantially identical to the claimed structure through known masking techniques. In particular Ageno teaches multilayer masking system not addressed in applicant's arguments and includes discussion of photolithographic techniques being appropriate for formation of such structures (see above). Please see Rogers, Using an Elastomeric phase mask for sub-100nm photolithography in optical near field; American Institute of Physics, March 1997; wherein near field optical photolithography techniques are shown using first a resist layer and then a masking layer (see figures). The technique is taught to be especially easy for forming sub 100 nm features (including curves) and should provide for new optical features and allow for work with non-planar substrates (see abstract). Given the above teachings of Rogers and combined with other references one of ordinary skill would have used the claimed resist and Mask layers in order to form sub 100-nm features and/or curves that allow for new optical properties in the invention of JP 2001.

25. See In re Dailey, 357 F.2d 669, 149 USPQ 47 (CCPA 1966); where the court held that configuration (or shape) was a matter of choice which a person of ordinary skill in the art would have found obvious absent persuasive evidence that the particular configuration was significant. In the instant case, to the extent to which there is a difference in shape of the masking layer, which the examiner is not convinced exists given the shape of the final product, the shape of the mask is considered a choice which

a person of ordinary skill in the art would have found obvious in order to form the circular cone shape of the cited art. No patentable distinction is seen.

26. Regarding the 103 rejection, and applicant's arguments that none of the references teach a mask and resist system, it is noted that Cathey (US 6,423,239) teaches a substantially similar method of producing a cone shaped protrusion with a two layered mask (30 and 32 from figures) as well as Ageno, also see newly cited Rogers which are considered to meet applicant's definition of a masking and resist system or otherwise render it obvious. No patentable distinction is seen.

27. Further, even if applicant's arguments regarding the order of the layers were found to be convincing, the order of the layers is not considered to be patentably distinguishing since the layers can easily be reversed and one of ordinary skill would expect to be able to achieve successful etching (again see Rogers). No patentable distinction seen.

28. It would have been obvious to one of ordinary skill in the art at the time of the invention to provide the claimed process and product, given what is known by one of ordinary skill in the art, the substantial similarity of the above disclosed processes and the desired product of JP'012 and include a multilayered mask of Cathey to obtain sharper tips, and an optimal silicon nitride layer of stochiometrically stable proportions (obtaining applicant's claimed range) as a masking layer in order to achieve a greater latitude of processing parameters, wherein the greater latitude in processing parameters would allow for the processing time to be manipulated so that the size of the tips (and therefore the diameter of the tips, aspect ratio, and apex angle) of the cone shaped

diamond protrusions can be controlled to form structures within the parameters of Baik and applicant's claimed invention. No patentable distinction is seen.

29. Given the density of the diamond tips taught by JP '012 and the height of the tips the emitter (1 micron), one of ordinary skill would expect that the apex angle would inherently be within applicant's claimed range; or in the alternative it would have been obvious to provide the apex angle, as claimed, or to naturally arrive at an apex angle within the disclosed range through the use of the above described known techniques, given the similarities between the claimed methods and the combined taught method, in order to form the density of protrusions taught by JP '012. No patentable distinction is seen.

Conclusion

30. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within

TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to DANIEL MILLER whose telephone number is (571)272-1534. The examiner can normally be reached on M-Th.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David Sample can be reached on (571)272-1376. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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